Journal of
APPLIED PHYSIOLOGY

VOLUME 3 *July 1950–June 1951*

BOARD OF PUBLICATION TRUSTEES

W. O. FENN, *Chairman* FRANK C. MANN R. F. PITTS

EDITORIAL BOARD

EDWARD F. ADOLPH
ROBERT A. CLEGHORN
RAY G. DAGGS
D. BRUCE DILL
A. PHARO GAGGE
CHALMERS L. GEMMILL
ASHTON GRAYBIEL
FRANCES HELLEBRANDT
EUGENE M. LANDIS
ERNST SIMONSON
ARTHUR H. STEINHAUS

MILTON O. LEE, *Managing Editor*

THE AMERICAN PHYSIOLOGICAL SOCIETY
Washington, D. C.

610.5
J86
A65

COPYRIGHT 1951, BY
THE AMERICAN PHYSIOLOGICAL SOCIETY, INC.

W.M.

PRINTED IN THE UNITED STATES OF AMERICA
BY WAVERLY PRESS, INC., BALTIMORE, MARYLAND

Medical
Pul Sub Serv

Contents of Volume 3

No. 1. JULY 1950

ELECTROCARDIOGRAPHY AND CARDIAC PHYSIOLOGY *Jane Sands Robb* 1

DEVICE FOR CONTINUOUS RECORDING OF CONCENTRATION OF EVANS BLUE DYE IN WHOLE BLOOD AND ITS APPLICATION TO DETERMINATION OF CARDIAC OUTPUT *A. Friedlich, R. Heimbecker and R. J. Bing* 12

HUMAN HEAT PRODUCTION IN RELATION TO BODY WEIGHT AND BODY SURFACE. III. INAPPLICABILITY OF SURFACE LAW ON FAT MEN OF TROPICAL ZONE. IV. GENERAL INTERPRETATION OF CLIMATIC INFLUENCE ON METABOLISM *Paulo Enéas Galvão* 21

INFLUENCE OF ANTIHISTAMINICS ON RESPIRATORY RESPONSE TO HYPOXIA *William L. Burkhardt, Burns R. Eastman and Henry B. Hale* 29

MEASUREMENT OF PATHOLOGICAL PAIN IN DISTINCTION TO EXPERIMENTAL PAIN *Arthur S. Keats, Henry K. Beecher and Frederick C. Mosteller* 35

VALUE OF DIFFERENT TEST FOODS IN ESTIMATING MASTICATORY ABILITY *A. Yurkstas and R. S. Manly* 45

No. 2. AUGUST 1950

EFFECT OF SALT DEFICIENCY ON THE SALT CONCENTRATION IN SWEAT *Sid Robinson, R. K. Kincaid and R. K. Rhamy* 55

A DISCREPANCY BETWEEN RENAL EXTRACTION AND URINARY EXCRETION OF VARIOUS SUBSTANCES (PARA-AMINOHIPPURATE, MANNITOL, CREATININE, THIOSULPHATE) IN MAN *François C. Reubi, Henry A. Schroeder, Palmer H. Futcher and Claudine Reubi* 63

PRODUCTION OF NEUROGENIC AFFERENT RENAL VASOCONSTRICTION IN HUMANS AND DOGS BY 2-BENZYL-4,5-IMIDAZOLINE HCl (PRISCOLINE) *W. Glenn Young, Jr., Jerome S. Harris, and W. C. Sealy* 77

INFLUENCE OF ADRENOCORTICOTROPHIC HORMONE (ACTH) ON DIFFERENCES OF POTENTIAL BETWEEN SYNOVIAL FLUID AND SKIN IN RHEUMATOID ARTHRITIS *Irving E. Steck, Max M. Montgomery, C. I. Reed and Norman R. Joseph* 84

RELATIONSHIP BETWEEN ISCHEMIA OF MUSCLES AND SERUM POTASSIUM *R. E. Rewell* 91

EFFICACY OF ARTIFICIAL RESPIRATION *Erling Asmussen and Marius Nielsen* 95

PHYSIOLOGICAL AND PERFORMANCE CHANGES IN ATHLETIC CONDITIONING *F. M. Henry and W. E. Berg* 103

No. 3. SEPTEMBER 1950

CAPILLARY CIRCULATION IN HUMAN ARMS STUDIED BY VENOUS CONGESTION. A CUTANEO-MUSCULAR VASOMOTOR REFLEX *Salomon Fisch, Saul B. Gilson and Robert E. Taylor* 113

STUDIES OF LUNG CAPACITIES AND INTRAPULMONARY MIXING: NORMAL LUNG CAPACITIES *J. B. Bateman* 133

Studies of Lung Volume and Intrapulmonary Mixing. Nitrogen Clearance Curves: Apparent Respiratory Dead Space and Its Significance *J. B. Bateman* 143

Left Phreno-Phrenic Anastomosis *N. C. Jefferson, C. W. Phillips and H. Necheles* 161

Reduction in Eosinophil Level of Adrenalectomized Mice Following Injection of Adrenocorticotropin, 11-Dehydro-17-Hydroxycorticosterone and Lipid Extracts of Human Urine *Eugenia Rosemberg and Roger A. Lewis* 164

No. 4. OCTOBER 1950

Influence of Various Environmental Temperatures on Cold and Warmth Thresholds *Franklin G. Ebaugh, Jr. and Rudolf Thauer* 173

Auricular Flutter Studied in Direct Leads from Human Heart *Franz M. Groedel and Max Miller* 183

Effect of High and Low Oxygen Levels and Intermittent Positive Pressure Breathing on Oxygen Transport in Lungs in Pulmonary Fibrosis and Emphysema *Hurley L. Motley and Joseph F. Tomashefski* 189

Normal Values for Serum Cholesterol and Basal Metabolic Rates and Their Correlation in Normal Man *Annie Laurie Peeler, Opal E. Hepler, Velma Miller Kinney, Lillian E. Cisler and Frederic T. Jung* 197

Physiological Effects and Possible Methods of Reducing Symptoms Produced by Rapid Changes in Speed and Direction of Airplanes as Measured in Actual Flight *John R. Poppen and Cecil K. Drinker* 204

Spontaneous Equilibration of Inspired CO_2 with Mixed Venous Blood: Some Theoretical Considerations *C. A. Forssander* 216

No. 5. NOVEMBER 1950

Critique of Area and Height Formulae for Estimating Cardiac Output From the Ballistocardiogram *Morton Galdston and J. Murray Steele* 229

Electrocardiographic Effects of Arterenol and Isopropylarterenol in Man, With a Note on the Auricular T Wave *A. Littman, M. I. Grossman, R. M. Gunnar, J. H. Isaacs, J. H. Hirschmann and E. F. Foley* 235

Polarity Patterns for Chest Leads *Jane Sands Robb* 243

Explosive Decompression of Macaque Monkeys to Extreme Altitudes and Recompression at Free-Fall Rates *Samuel Gelfan* 254

Normal Variations in End-Tidal Air and Arterial Blood Carbon Dioxide and Oxygen Tensions During Moderate Exercise *Mitzi Suskind, Robert A. Bruce, Marion E. McDowell, Paul N. G. Yu and Frank W. Lovejoy, Jr.* 282

Effects of Exercise on Renal Blood Flow and Sodium Excretion in Dogs *M. Richard Carlin, C. Barber Mueller and H. L. White* 291

No. 6. DECEMBER 1950

Effect of Carbon Dioxide on Rate of Denitrogenation in Human Subjects *Rodolfo Margaria and Julius Sendroy, Jr.* 295

Body Temperature and Performance Under Different Routines
Nathaniel Kleitman and Dudley P. Jackson 309

Relation of Blood Volume and Cardiac Output to Body Type
M. I. Gregersen and J. L. Nickerson 329

Heat Transfer in Man *D. K. C. MacDonald and C. H. Wyndham* 342

Morphology and Enumeration of Human Blood Platelets
George Brecher and Eugene P. Cronkite 365

No. 7. JANUARY 1951

Effect of Prehydration on Response to Saline Infusion in Man *Michael Ladd* 379

Permeability of Dura Mater to Epidural Procaine in Dogs
Donald O. Rudin, Kenneth Fremont-Smith and Henry K. Beecher 388

Direct Measurement of Renal Vessel Pressures Under Stress of Acceleration
Smith W. Ames, Sheldon Rosenfeld and Charles F. Lombard 399

Strength and Endurance in the Waking and Hypnotic States *Elsie Shaw Roush* 404

Immediate Effects of Shock Therapies, Epinephrine and ACTH on Blood Glutathione Level of Psychotic Patients
Dorothy Hughes Henneman and Mark D. Altschule 411

Resuscitation of Dogs from Fresh Water Drowning
David C. Fainer, Clement G. Martin and A. C. Ivy 417

Aerobic Oxygen Consumption and Alactic Debt in Muscular Work
Franklin M. Henry 427

No. 8. FEBRUARY 1951

Effect of Exercise on Circulatory Dynamics of Normal Individuals
L. Dexter, J. L. Whittenberger, F. W. Haynes, W. T. Goodale, R. Gorlin and C. G. Sawyer 439

Instantaneous Equipotential Distribution on Surface of the Human Body for Various Instants in the Cardiac Cycle
L. H. Nahum, Alexander Mauro, Hyman M. Chernoff and Rajinder S. Sikand 454

Effects of Various Drugs Upon Cerebral Circulation and Metabolism of Man
Henry A. Shenkin 465

Opening of Intrarenal Arteriovenous Shunts Without Cortical Ischemia by Sudden Administration of Salt-Poor Concentrated Human Serum Albumin
Alexander J. Michie, Nicholas Gimbel, Cecilia Riegel and M. Ragni 472

Requirements for Resuscitation by Artificial Respiration in Fulminating Anoxia
M. Brucer and H. G. Swann 479

Site of Asphyxial Block in Mammalian Retinae *Werner K. Noell* 489

Influence of Muscular Exercise on Uric Acid Excretion in Man
John Nichols, A. T. Miller, Jr. and E. P. Hiatt 501

Effect of Local Cooling on Finger Blood Flow in Individuals Exposed to Warm Ambient Temperature *Mortimer E. Bader and Jere Mead* 508

No. 9. MARCH 1951

EFFECT OF ADRENALINE ON RESISTANCE TO GAS FLOW IN RESPIRATORY TRACT AND ON VITAL CAPACITY OF NORMAL AND ASTHMATIC SUBJECTS
Murray B. Sheldon, Jr. and Arthur B. Otis 513

ALVEOLAR-ARTERIAL OXYGEN DIFFERENCE—A COMPARISON OF TWO METHODS
B. G. Ferris, Jr., Harriet A. Kriete and Bertrand C. Kriete 519

COMPOSITION OF ALVEOLAR AIR AND VOLUME OF PULMONARY VENTILATION DURING LONG EXPOSURE TO HIGH ALTITUDE *R. L. Riley and C. S. Houston* 526

POSITIVE AND ALTERNATING POSITIVE-NEGATIVE PRESSURE RESUSCITATION FROM CURARE POISONING *Stanley W. Handford and N. V. Ricchiuti* 535

CLOT-ACCELERATING PROPERTY OF IN VITRO EPINEPHRINE AND NOR-EPINEPHRINE ON WHOLE BLOOD COAGULATION *Jerome M. Waldron* 554

PTEROYLGLUTAMIC ACID CLEARANCE IN NORMAL ADULTS *Charles W. Denko* 559

REGIONAL DIFFERENCES IN SOME OF THE PHYSICAL PROPERTIES OF THE HUMAN FEMUR
F. Gaynor Evans and Milton Lebow 563

No. 10. APRIL 1951

STIMULATION AND INHIBITION OF HUMAN SWEAT GLANDS BY INTRADERMAL SYMPATHOMIMETIC AGENTS *R. R. Sonnenschein, H. Kobrin, H. D. Janowitz and M. I. Grossman* 573

MECHANICAL IMPEDANCE OF SURFACE OF THE HUMAN BODY *Ernst K. Franke* 582

PHYSIOLOGICAL RESPONSES OF MEN TO CHILLING IN ICE WATER AND TO SLOW AND FAST REWARMING *A. R. Behnke and C. P. Yaglou* 591

EFFECT OF PREHYDRATION UPON RENAL EXCRETION OF SODIUM IN MAN *Michael Ladd* 603

EFFECTS OF EPINEPHRINE ON NORMAL, HYPERTENSIVE AND DENERVATED RENAL VASCULAR SYSTEMS IN MAN *Donald W. Koza, Frederic J. Kottke and Mildred Olson* 610

TOBACCO SMOKING AND PHYSICAL PERFORMANCE *Peter V. Karpovich and Creighton J. Hale* 616

THE ACT OF DEGLUTITION: A CINEFLUOROGRAPHIC STUDY
Robert F. Rushmer and John A. Hendron 622

ELECTRO-POTENTIAL CHANGES IN HUMAN URINARY BLADDER: A METHOD OF MEASUREMENT *E. L. Corey, W. H. Boyce, S. A. Vest and C. R. French* 631

No. 11. MAY 1951

EFFECT OF HIGH CARBON DIOXIDE AND OF LOW OXYGEN CONCENTRATION ON FUSION FREQUENCY OF FLICKER *Ernst Simonson and Paul Winchell* 637

OBSERVATIONS ON DOGS WITH MECHANICALLY SUSTAINED CIRCULATION AND RESPIRATION
J. Jongbloed 642

OXIMETRIC DETERMINATIONS OF CARDIAC OUTPUT RESPONSES TO LIGHT EXERCISES
William Sleator, Jr., James O. Elam, William N. Elam and H. L. White 649

DIURNAL VARIATIONS IN BODY TEMPERATURES
Henry C. Mellette, B. K. Hutt, S. I. Askovitz and Steven M. Horvath 665

RELATION OF SPECIFIC GRAVITY TO BODY BUILD IN A GROUP OF HEALTHY MEN
C. Wesley Dupertuis, Grover C. Pitts, Elliott F. Osserman, W. C. Welham and A. R. Behnke 676

Body Composition of Cattle. I. Estimation of Body Fat From Measurement in Vivo of Body Water by Use of Antipyrine
H. F. Kraybill, O. G. Hankins and H. L. Bitter 681

No. 12. JUNE 1951

Effects of Extreme Heat and Cold on Human Skin. I. Analysis of Temperature Changes Caused by Different Kinds of Heat Application *Konrad Buettner* 691

Effects of Extreme Heat and Cold on Human Skin. II. Surface Temperature, Pain and Heat Conductivity in Experiments With Radiant Heat *Konrad Buettner* 703

Reflex Factors in Clonus and Tremor
Margaret H. Clare, Warren H. Mills and George H. Bishop 714

Effect of Exercises of Graded Intensity on Neuromuscular Tremor as Measured by a Strain Gauge Technique
W. W. Tuttle, C. D. Janney, D. Wilkerson, Jr. and C. J. Imig 732

Glucuronic Acid and Cinchophen Ulcer *D. F. Magee, K. S. Kim and A. C. Ivy* 736